The Importance of Research into the Effects of Ocean Noise on Marine Mammals

A Presentation to the Ocean Exploration Panel

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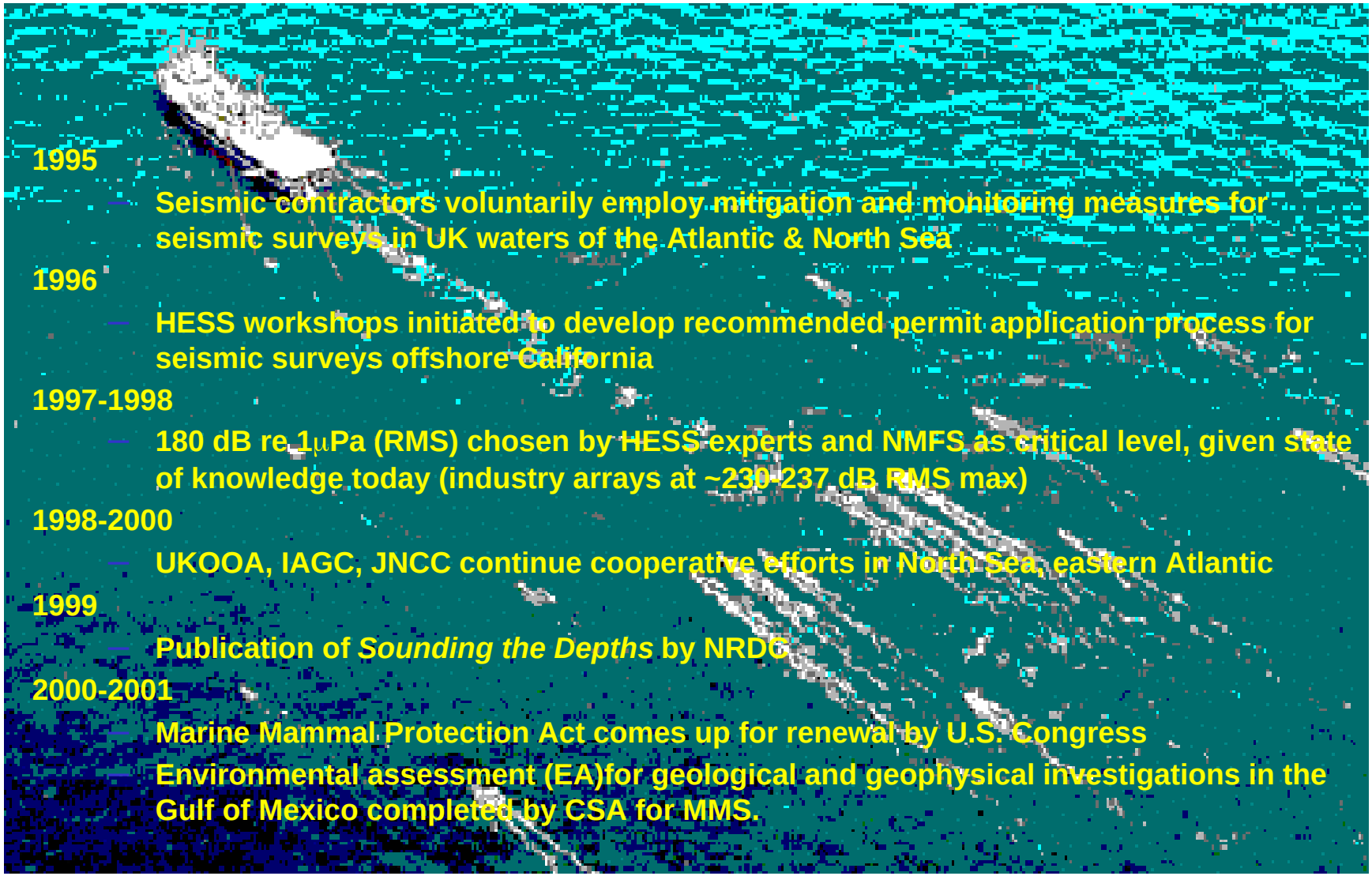
Tidbits on Marine Mammals and Seismic Sources



1995

- Seismic contractors voluntarily employ mitigation and monitoring measures for seismic surveys in UK waters of the Atlantic & North Sea

1996

- HESS workshops initiated to develop recommended permit application process for seismic surveys offshore California

1997-1998

- 180 dB re 1μPa (RMS) chosen by HESS experts and NMFS as critical level, given state of knowledge today (industry arrays at ~230-237 dB RMS max)

1998-2000

- UKOOA, IAGC, JNCC continue cooperative efforts in North Sea, eastern Atlantic

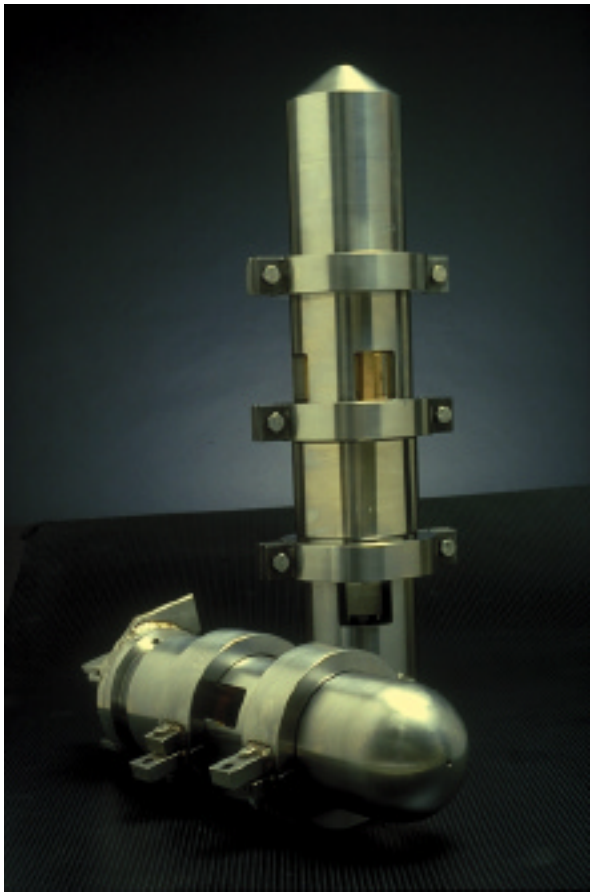
1999

- Publication of *Sounding the Depths* by NRDC

2000-2001

- Marine Mammal Protection Act comes up for renewal by U.S. Congress
- Environmental assessment (EA)for geological and geophysical investigations in the Gulf of Mexico completed by CSA for MMS.

Are Seismic Airgun Sources Harmful to Marine Mammals?

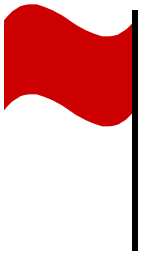


Do they cause permanent injury?

Do they mask communications?

Do they affect ability to breed, to feed?

Do they alter/affect habitats?



Do they, in any way, reduce mammals' ability to survive?

Biological Issues with Respect to Noise in the Oceans

- What is the geographical distribution and density of different species of marine mammals?
- Does the acceptable (i.e., not dangerous) pressure level vary from species to species?
- Does the frequency band of concern vary from species to species?
- Is an intermittent loud sound of greater concern than a constant sound of lower volume?
- ***Very few actual data points exist that can lead to a definitive/specific conclusion on the effect of noise on marine mammals.***

Mitigation: Currently What & Where

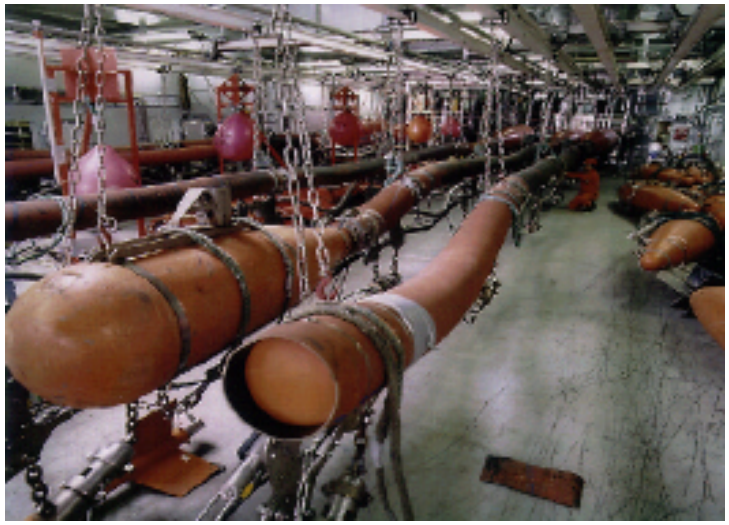
What

- Soft start or ramp-up
- Maintenance of a safety zone (typically 500 -2500 meters)
- Immediate shutdown if safety zone invaded by marine mammal*
- 20-minute wait after last mammal observed in safety zone
- Observation of seasonal and/or geographical limits
- Rigorous visual monitoring by trained/approved observers
- Acoustic monitoring

Where

- Offshore west coast U.S.
- Offshore Alaska
- Offshore east coast Canada
- Much of North Sea
- UK Atlantic waters
- Offshore Australia
- Offshore South Africa

Comments from a Seismic Contractor



- Oil industry strongly endorses research into the **effects of ocean noise on marine mammals**
- Have expert biologists and acousticians define the (optimum) research program
- A mixture of short term efforts (~3 years) and long term efforts (up to ~20 years) likely to yield more definitive results
- Partnering among different government entities, academic bodies, and industry groups should be strongly encouraged
- An international effort likely to be more successful than an U.S.-only effort

What Should Oil Industry Do?

- Continue to educate itself with respect to this overall issue, make active decision whether to increase its participation in the discussion or not
- Actively participate in the ***research / generation of knowledge*** concerning the effects of ocean noise on marine mammals (including possibly proactively supplying funding for research in this area)
- Strongly support the development of a scientific basis for regulations, mitigation measures, and monitoring requirements

Oil Industry and Noise in the Oceans

- Participation in HESS team activities since 1996
- IAGC and UKOOA workshops in 1998, 1999; working group meeting in February, 2000
- Involvement of NOIA in 09/99
- ***Oil & Gas Journal*** article 09/13/99 issue
- IAGC meeting on 01/19/00 in Houston
- Presentation to SEG Executive Committee on March 4, 2000
- Workshop on 03/14/00 in The Woodlands, Texas
- Involvement of SEG External Activities Committee beginning 03/01/00
- Editorial in 04/00 issue of ***The Leading Edge***
- Article in ***Online Oil and Gas Newsletter***
- NOIA-coordinated meeting on April 9, 2000, in Washington
- Collection of papers on this topic published in August issue of ***TLE***
- Workshop on 08/11/00 at SEG Convention in Calgary
- Invited panel of biologists to meet in 12/00 to create a list of research needs and priorities

Possible SEG* Executive Committee Actions

- Become generally educated about marine mammals & airguns
- Brief the Inter-Society Council, especially the SPE, which seems to have taken a lead role wrt HSE issues
- Consider/solicit project proposals from biologists doing research in this area
- Formulate a position with regard to the issue of marine mammals and airguns
- Endorse the creation of an industry-wide funding effort for research into mammals and airguns
- “Seed the pot” in an industry-wide funding endeavor

*Society of Exploration Geophysicists
(a professional society)

Marine Mammals - Some Reactions To Noise

- Migrating gray whales, San Luis Obispo - Jan., 1998: when sound of LFA sonar ship was turned up from 170 dB to 185 dB, bypassed the source by more than a kilometer rather than by a couple of hundred meters - is it level or type of sound?
- Migrating gray whales, San Luis Obispo - 1999: when LFA sonar ship was removed from migration path, whales did not deviate, even though sound level the same
- Bowhead and gray whales often show avoidance several kilometers from sources at received levels of 150 -180 dB re 1µPa. Perhaps as low as 120 - 130 dB.
- CAT and MRI scans, dissections indicate marine mammals have sustained permanent hearing damage - what causes the damage?

1997 JNCC Sighting Reports
(730 Sightings, 8,528 Individuals)

When Air Guns Were Firing Versus
When They Were Not Firing:

- Sighting rate higher for pilot whales
- Sighting rate lower for all dolphins
- Sighting rate of other mammals no different
- Dolphins, minke whales, fin/sei whales farther from air guns
- Pilot and fin whales swam at increased speeds
- Cetaceans altered course more often
- Sperm whales dived more often
- Bow-riding, swimming alongside the paravanes less frequent
- Relatively more cetaceans were seen during periods of shooting in deeper waters than during these periods in shallower waters